

**ACI 117-10**

**Specification for Tolerances for  
Concrete Construction and Materials  
(ACI 117-10) and Commentary**

An ACI Standard

Reported by ACI Committee 117



**American Concrete Institute®**



First printing  
June 2010

American Concrete Institute®  
*Advancing concrete knowledge*

## **Specification for Tolerances for Concrete Construction and Materials and Commentary**

Copyright by the American Concrete Institute, Farmington Hills, MI. All rights reserved. This material may not be reproduced or copied, in whole or part, in any printed, mechanical, electronic, film, or other distribution and storage media, without the written consent of ACI.

The technical committees responsible for ACI committee reports and standards strive to avoid ambiguities, omissions, and errors in these documents. In spite of these efforts, the users of ACI documents occasionally find information or requirements that may be subject to more than one interpretation or may be incomplete or incorrect. Users who have suggestions for the improvement of ACI documents are requested to contact ACI. Proper use of this document includes periodically checking for errata at [www.concrete.org/committees/errata.asp](http://www.concrete.org/committees/errata.asp) for the most up-to-date revisions.

ACI committee documents are intended for the use of individuals who are competent to evaluate the significance and limitations of its content and recommendations and who will accept responsibility for the application of the material it contains. Individuals who use this publication in any way assume all risk and accept total responsibility for the application and use of this information.

All information in this publication is provided “as is” without warranty of any kind, either express or implied, including but not limited to, the implied warranties of merchantability, fitness for a particular purpose or non-infringement.

ACI and its members disclaim liability for damages of any kind, including any special, indirect, incidental, or consequential damages, including without limitation, lost revenues or lost profits, which may result from the use of this publication.

It is the responsibility of the user of this document to establish health and safety practices appropriate to the specific circumstances involved with its use. ACI does not make any representations with regard to health and safety issues and the use of this document. The user must determine the applicability of all regulatory limitations before applying the document and must comply with all applicable laws and regulations, including but not limited to, United States Occupational Safety and Health Administration (OSHA) health and safety standards.

**Order information:** ACI documents are available in print, by download, on CD-ROM, through electronic subscription, or reprint and may be obtained by contacting ACI.

Most ACI standards and committee reports are gathered together in the annually revised *ACI Manual of Concrete Practice* (MCP).

**American Concrete Institute**  
**38800 Country Club Drive**  
**Farmington Hills, MI 48331**  
**U.S.A.**

**Phone: 248-848-3700**  
**Fax: 248-848-3701**

**[www.concrete.org](http://www.concrete.org)**

ISBN 978-0-87031-379-0

# Specification for Tolerances for Concrete Construction and Materials (ACI 117-10) and Commentary

An ACI Standard

Reported by ACI Committee 117

Eldon G. Tipping  
Chair

Scott Michael Anderson  
Secretary

Scott M. Anderson  
Karl J. Bakke  
David K. Ballast  
Bryan M. Birdwell  
Gregory P. Birley  
Thomas J. Downs  
Ron Eldridge

Allen Face  
Robert A. Halvorson  
Mark G. Josten  
Richard L. Knox  
Jeff L. LaRue  
Michael W. Lee  
Michael L. Leming

Donald M. Marks  
Ross S. Martin  
Steven W. McCrary  
Arthur W. McKinney  
Colin T. Milberg  
William R. Nash  
Bob L. Payne

David N. Peterson  
William S. Phelan  
B. Duke Pointer  
Peter J. Ruttura  
Michael J. Schneider  
Bruce A. Suprenant  
Michael A. West

*Specification synopsis: This specification provides standard tolerances for concrete construction and materials. This document is intended to be used by specification writers and ACI committees writing standards as the reference document for establishing tolerances for concrete construction and materials.*

*Commentary synopsis: This report is a commentary on the "Specifications for Tolerances for Concrete Construction and Materials (ACI 117)." It is intended to be used with ACI 117 for clarity of interpretation and insight into the intent of the committee regarding the application of the tolerances set forth therein.*

**Keywords:** architectural concrete; concrete; construction; drilled piers; formwork; foundation; mass concrete; pier; precast concrete; prestressed concrete; reinforced concrete; reinforcement; specification; splice; tilt-up concrete; tolerances.

ACI Committee Reports, Guides, Manuals, and Commentaries are intended for guidance in planning, designing, executing, and inspecting construction. This document is intended for the use of individuals who are competent to evaluate the significance and limitations of its content and recommendations and who will accept responsibility for the application of the material it contains. The American Concrete Institute disclaims any and all responsibility for the stated principles. The Institute shall not be liable for any loss or damage arising therefrom.

Reference to this document shall not be made in contract documents. If items found in this document are desired by the Architect/Engineer to be a part of the contract documents, they shall be restated in mandatory language for incorporation by the Architect/Engineer.

ACI 117 Specification and Commentary are presented in a side-by-side column format, with code text placed in the left column and the corresponding commentary text aligned in the right column. To distinguish the specification from the commentary, the specification has been printed in Helvetica, which is the typeface for this paragraph.

The Commentary is printed in Times Roman, which is the typeface for this paragraph. Commentary section numbers are preceded by the letter "R" to distinguish them from specification section numbers. The commentary is not a part of ACI Specification 117-10.

ACI 117-10 supersedes ACI 117-06 and was adopted March 1, 2010 and published June 2010.

Copyright © 2010, American Concrete Institute.

All rights reserved including rights of reproduction and use in any form or by any means, including the making of copies by any photo process, or by electronic or mechanical device, printed, written, or oral, or recording for sound or visual reproduction or for use in any knowledge or retrieval system or device, unless permission in writing is obtained from the copyright proprietors.

**CONTENTS****Introduction, p. 117-3****Section 1—General requirements, p. 117-5**

- 1.1—Scope
- 1.2—Requirements
- 1.3—Definitions
- 1.4—Referenced standards

**Section 2—Materials, p. 117-13**

- 2.1—Reinforcing steel fabrication and assembly
- 2.2—Reinforcement location
- 2.3—Placement of embedded items, excluding dowels in slabs-on-ground
- 2.4—Concrete batching
- 2.5—Concrete properties

**Section 3—Foundations, p. 117-25**

- 3.1—Deviation from plumb
- 3.2—Deviation from location
- 3.3—Deviation from elevation
- 3.4—Deviation from plane
- 3.5—Deviation from cross-sectional dimensions of foundations

**Section 4—Cast-in-place concrete for buildings, p. 117-31**

- 4.1—Deviation from plumb
- 4.2—Deviation from location
- 4.3—Not used
- 4.4—Deviation from elevation
- 4.5—Deviation from cross-sectional dimensions
- 4.6—Deviation from formed opening width or height
- 4.7—Deviation from relative elevations or widths for stairs
- 4.8—Deviation from slope or plane
- 4.9—Sawcut depth in slab-on-ground

**Section 5—Cast-in-place concrete at interface with precast concrete (except tilt-up concrete), p. 117-45**

- 5.1—Deviation from elevation—cast-in-place concrete
- 5.2—Deviation from location—cast-in-place concrete
- 5.3—Deviation from dimension—cast-in-place concrete
- 5.4—Deviation from plane at bearing surface—cast-in-place concrete measured over length or width of bearing surface

**Section 6—Masonry, p. 117-51**

This section has been removed.

**Section 7—Cast-in-place, vertically slipformed building elements, p. 117-53**

- 7.1—Deviation from plumb for buildings and cores
- 7.2—Horizontal deviation
- 7.3—Cross-sectional dimensions
- 7.4—Openings through elements
- 7.5—Embedded plates
- 7.6—Deviation from plumb for slipformed and jump-formed silos

**Section 8—Mass concrete, p.117-55**

- 8.1—Deviation from plumb

- 8.2—Horizontal deviation
- 8.3—Vertical deviation
- 8.4—Cross-sectional dimension
- 8.5—Deviation from plane

**Section 9—Canal lining, p. 117-57**

- 9.1—Horizontal deviation
- 9.2—Vertical deviation
- 9.3—Cross-sectional dimensions

**Section 10—Monolithic water-conveying tunnels, siphons, conduits, and spillways, p. 117-59**

- 10.1—Horizontal deviation
- 10.2—Vertical deviation
- 10.3—Cross-sectional dimensions
- 10.4—Deviation from plane

**Section 11—Cast-in-place bridges, p. 117-61**

- 11.1—Deviation from plumb
- 11.2—Horizontal deviation
- 11.3—Vertical deviation
- 11.4—Length, width, or depth of specified elements
- 11.5—Deviation from plane
- 11.6—Deck reinforcement cover
- 11.7—Bearing pads

**Section 12—Exterior pavements and sidewalks, p. 117-63**

- 12.1—Horizontal deviation
- 12.2—Vertical deviation of surface

**Section 13—Chimneys and cooling towers, p. 117-65**

- 13.1—Deviation from plumb
- 13.2—Outside shell diameter
- 13.3—Wall thickness

**Section 14—Cast-in-place nonreinforced pipe, p.117-67**

- 14.1—Wall thickness
- 14.2—Pipe diameter
- 14.3—Offsets
- 14.4—Surface indentations
- 14.5—Grade and alignment
- 14.6—Concrete slump

**Section 15—Tilt-up concrete, p. 117-69**

- 15.1—Panel forming
- 15.2—Deviation from plumb
- 15.3—Deviation from elevation
- 15.4—Deviation from location
- 15.5—Deviation from slope or plane
- 15.6—Deviation from relative widths

**Notes to Specifier, p. 117-73**

General notes

**Foreword to checklists, p. 117-75****Mandatory Requirements Checklist, p. 117-75****Optional Requirements Checklist, p. 117-76**

# INTRODUCTION

## SPECIFICATION

## COMMENTARY

This commentary pertains to “Specifications for Tolerances for Concrete Construction and Materials (ACI 117-10).” The purpose of the commentary is to provide an illustrative and narrative complement to the specification; it is not a part of the specification.

No structure is exactly level, plumb, straight, and true. Tolerances are a means to establish permissible variation in dimension and location, giving both the designer and the contractor limits within which the work is to be performed. They are the means by which the designer conveys to the contractor the performance expectations upon which the design is based or that the project requires. Such specified tolerances should reflect design assumptions and project needs, being neither overly restrictive nor lenient.

Necessity rather than desirability should be the basis of selecting tolerances.

As the title “Specifications for Tolerances for Concrete Construction and Materials (ACI 117)” implies, the tolerances given are standard or usual tolerances that apply to various types and uses of concrete construction. They are based on normal needs and common construction techniques and practices. Specified tolerances at variance with the standard values can cause both increases and decreases in the cost of construction.

*Economic feasibility*—The specified degree of accuracy has a direct impact on the cost of production and the construction method. In general, the higher degree of construction accuracy required, the higher the construction cost, and the lower the degree of construction accuracy, the higher the cost of required repairs.

*Relationship of all components*—The required degree of accuracy of individual parts can be influenced by adjacent units and materials, joint and connection details, and the possibility of the accumulation of tolerances in critical dimensions.

*Construction techniques*—The feasibility of a tolerance depends on available craftsmanship, technology, materials, and project management.

*Compatibility*—Designers are cautioned to use finish and architectural details that are compatible with the type and anticipated method of construction. The finish and architectural details used should be compatible with achievable concrete tolerances.